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Short Communication

New records of domestic dog negative impacts on native vertebrates in the Ecuadorian Andes

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Abstract

Domestic dogs (*Canis familiaris*) significantly threaten endangered vertebrates worldwide. In this study, we report 11 documented cases of dogs chasing, harassing, competing for food resources, biting, and killing six native vertebrate species in the Ecuadorian Andes: Andean condor (*Vultur gryphus*), mountain tapir (*Tapirus pinchaque*), little red brocket deer (*Mazama rufina*), Andean fox (*Lycalopex culpaeus*), white-tailed deer (*Odocoileus virginianus*), and Andean tapeti (*Sylvilagus andinus*). Dog attacks on wildlife can lead to mortality through direct injury and by transmitting diseases, potentially threatening the conservation of globally endangered species such as the Andean condor, mountain tapir, and little red brocket deer. Effective management and conservation of native vertebrates in Andean ecosystems require a comprehensive understanding of the multifaceted impacts of dogs on wildlife populations. These impacts include direct attacks, disease transmission, fear-induced behavioral changes, competition for food resources, and conflicts with local farmers, which may inadvertently lead to wildlife poisoning.

Key words: Alien species, Andes, conservation

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The spread of alien species significantly threatens biodiversity (Groom et al. 2006). Domestic dogs (*Canis familiaris*)—including feral, free-ranging, and owned, human-dependent individuals (hereafter, dogs)—have contributed to at least 11 vertebrate species extinctions (Doherty et al. 2017). Human-dog interfaces are complex social-ecological systems that require proper management, particularly in South America, where the estimated dog-to-human ratio is approximately 1:4.7, with noticeable differences between countries (Gompper 2013; Lambertucci et al. 2023). Even though the negative impacts of dogs on wildlife in this continent are well-known, records of disease transmission, direct attacks causing injury, harassment, fear-mediated behavioral changes, competition for food resources, and human-wildlife conflicts due to dog predation on livestock are of

great concern (Lessa et al. 2016; Zapata-Ríos and Branch 2016; Zamora-Nasca et al. 2021; Castellanos et al. 2022; Restrepo-Cardona et al. 2022; Lambertucci et al. 2023; Monar-Barragan et al. 2023; Cepeda-Duque et al. 2024).

To design and implement efficient conservation strategies and actions, managers must know how and where dogs affect wildlife (Doherty et al. 2017). Here we present 11 recorded cases of dogs chasing, harassing, biting, and killing six native vertebrate species in the Ecuadorian Andes (Fig. 1): Andean condor (*Vultur gryphus*), mountain tapir (*Tapirus pinchaque*), little red brocket deer (*Mazama rufina*), Andean fox (*Lycalopex culpaeus*), white-tailed deer (*Odocoileus virginianus*), and Andean tapeti (*Sylvilagus andinus*). The recorded cases were compiled from non-systematic observations, camera traps, and technical reports that the authors conducted between 2014 and 2025. Furthermore, we calculated the distance from each recorded case to the nearest human settlement and protected area.

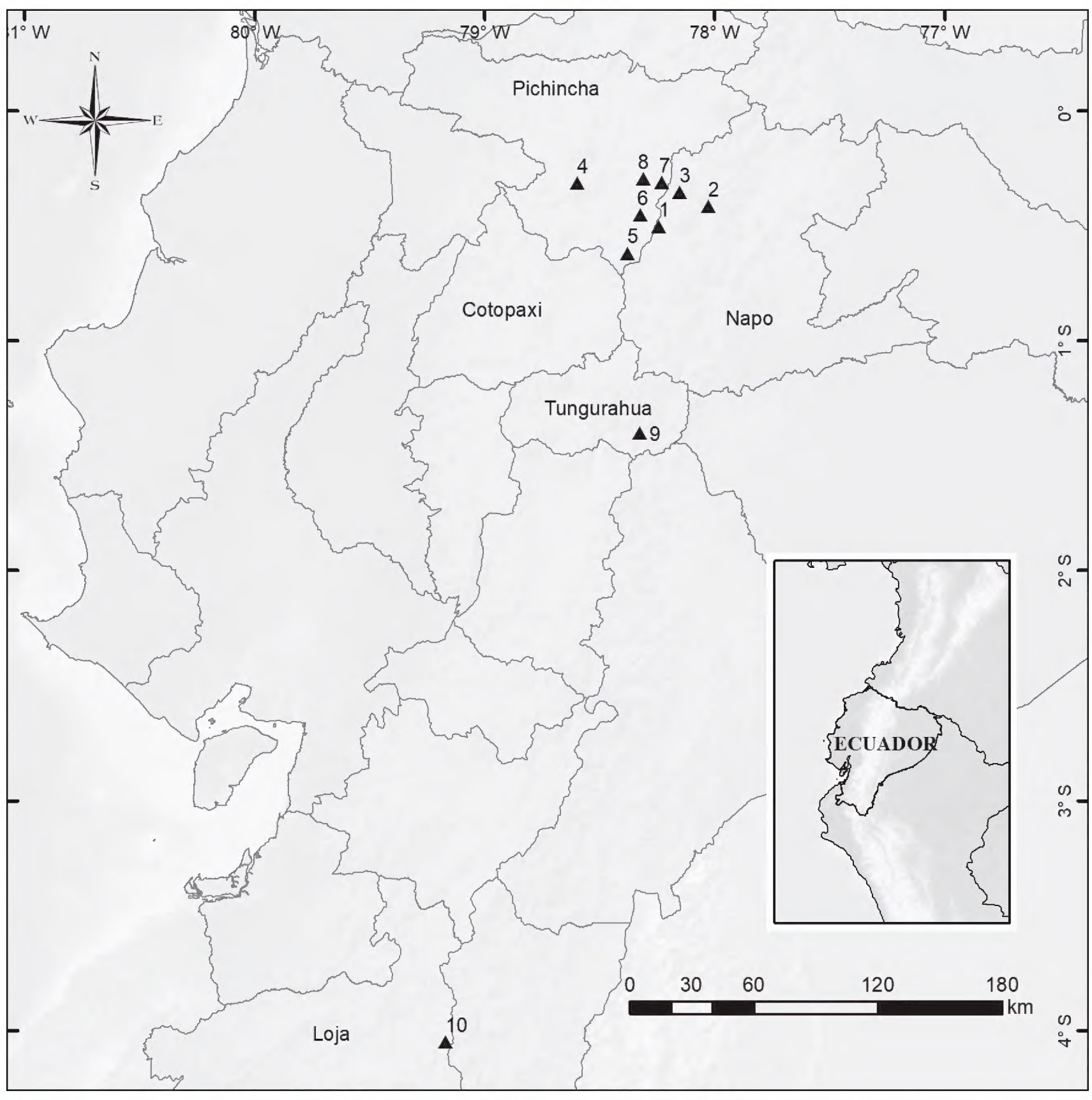

Figure 1. Map of the locations of recorded cases of domestic dog negative impacts on six native vertebrate species in the Ecuadorian Andes. (1) Área de Conservación Hídrica (ACH) Antisana, (2) Quijos, (3) Papallacta, (4) ACH Atacazo, (5) ACH Alto Pita, (6) Reserva Chakana, (7) Refugio de Vida Silvestre Área de Protección Hidrica Ponce-Palugillo, (8) Itulchachi, (9) San Pedro, (10) Private Reserve Madrigal del Podocarpus.

Three cases were reported for the province of Napo. In the Área de Conservación Hídrica (ACH) Antisana (Fig. 1; location 1) at 3994 m a.s.l. (0°30'15.85"S, 78°14'34.94"W), in December 2021, at 08:36 h, an adult Andean condor was observed feeding on a natural deer carcass approximately 95% consumed. The condor flew after noticing a group of three dogs that ran towards the carcass. The dogs smelled the dead animal but did not consume it and, 30 seconds later, left the area. In Quijos (Fig. 1; location 2), at 2368 m a.s.l. (0°24'59.14"S, 78°1'40.82"W), on 24 March 2023, local firefighters informed the environmental authority of a female mountain tapir, approximately 5 months old, found on a farm after being attacked by dogs in the forest. The tapir was rescued and taken to the Quito Zoo. The individual was diagnosed with myiasis, septicemia, and a secondary fracture caused by the dog attack. The medical exams indicated inflammation and infection due to multiple dog bites and osteomyelitis due to bone trauma. In Papallacta (Fig. 1; location 3), at 3450 m a.s.l. (0°21'15.61"S, 78°9'9.84"W), on 26 May 2023, a local person reported rescuing another female mountain tapir, approximately 8 months old, found in the National Park Cayambe-Coca after being attacked by dogs. The tapir was once again rescued and taken to the Quito Zoo. Medical exams showed that the animal had four lesions due to dog bites, inflammation and infection due to the bites, osteomyelitis in one exposed bone lesion, luxation, and coxofemoral arthrosis. In addition, antibiotic-resistant bacteria (i.e., *Staphylococcus aureus*, *Escherichia coli*) were found in both tapir samples. The two individuals died due to these degenerative chronic conditions, but we cannot asseverate that it was a consequence of dog attacks. The distance from the recorded site in Quijos to the nearest protected area, i.e., the Cayambe-Coca National Park, is 1 km. The distance between the sites of the recorded cases in Quijos and Papallacta is 15.5 km. The linear distances from the recorded cases in ACH Antisana, Quijos, and Papallacta to the nearest settlements were 3.6 km, 0.18 km, and 0.74 km, respectively.

Six cases were reported in the Province of Pichincha, two through camera traps and four from direct observations. In the ACH Atacazo (Fig. 1; location 4), at 3746 m a.s.l. (0°18'54.63"S, 78°35'53.30"W), on 28 February 2022, a sequence of photographs was taken at 10:00 h, in which an Andean tapeti was observed running through the detection field of the camera trap, and 14 seconds later, three dogs ran past in the same direction. In the ACH Alto Pita (Fig. 1; location 5), at 3877 m a.s.l. (0°37'14.01"S, 78°22'48.4"W), on 13 October 2023, a camera trap was installed in a horse carcass. On the 15th of October, a sequence of photographs was taken in which, at 10:56 h, an Andean fox was feeding from the carrion and being very wary of its surroundings. At 11:02 h, the fox ran away, and a second later, two dogs went past the camera, running in the same direction as the fox. Afterward, the dogs returned to feed on the carcass (Fig. 2). In the Reserva Chakana (Fig. 1; location 6), at 3400 m a.s.l. (0°27'14.04"S, 78°19'24.96"W), in 2014 at around 15:00 h, three dogs were observed, from across the canyon, chasing a white-tailed deer. On 29 February 2024, at 9:37 h, an Andean tapeti was observed running below the lookout at Peñon del Isco. Less than a minute later, two dogs ran into the area, frantically smelling the ground and actively looking for the rabbit (Andean tapeti) among the bushes and grasses. In the Refugio de Vida Silvestre Área de Protección Hidrica (APH) Ponce-Palugillo (Fig. 1; location 7), at 3705 m a.s.l. (0°18'48.97"S, 78°13'43.34"W), on February 25, 2022, at 16:45 h, two dogs chasing an Andean tapeti were observed. Whereas in Itulchachi (Fig. 1; location 8), at 3400 m a.s.l. (0°17'51.35"S, 78°18'39.06"W), on April 12, 2018,

Figure 2. Domestic dogs (*Canis familiaris*) chasing an Andean fox (*Lycalopex culpaeus*) in the Área de Conservación Hídrica Alto Pita in the Andes of Ecuador.

at 15:00 h, four dogs were recorded chasing and harassing a white-tailed deer. The distance from the recorded case in Itulchachi to the nearest protected area is 3.94 km to the Refugio de Vida Silvestre APH Ponce-Palugillo. The linear distances from the recorded cases in ACH Atacazo, ACH Alto Pita, Reserva Chakana, Refugio de Vida Silvestre APH Ponce-Palugillo, and Itulchachi to the nearest settlements were 2.13 km, 10.51 km, 0.55 km, 0.8 km, and 0.07 km, respectively.

One case was recorded in the Tungurahua Province, in San Pedro (Fig. 1; location 9), at 1800 m a.s.l. (1°24'10.37"S, 78°19'31.58"W). On 7 January 2025, at 16:00 h, two dogs chasing, harassing, and biting a little red brocket deer was recorded. The distance from the recorded case in San Pedro to the nearest protected area is 4.07 km to the Llanganates National Park. Another case was documented in Loja Province, within the Private Reserve Madrigal del Podocarpus (Fig. 1; location 10), at 2500 m a.s.l. (4°03'03.07"S, 79°10'13.75"W). On 22 November 2023, a camera trap recorded a little red brocket deer at 08:42 h, running across the trail and then returning, changing direction, and entering the forest. Fourteen minutes later, at 08:56 h, two dogs followed the same path, crossing the trail and then returning, changing direction, and entering the forest at the location where the deer had disappeared. The dogs displayed clear behaviors indicative of active search and pursuit (Fig. 3). Part of this reserve is within the boundaries of Podocarpus National Park. The linear distances from the recorded cases in San Pedro and Private Reserve Madrigal del Podocarpus to the nearest settlements were 0.6 km and 3.12 km, respectively.

Our observation of an adult Andean condor fleeing from dogs in the ACH Antisana, which is the most important population stronghold of the species in Ecuador (Vargas et al. 2018), is the second documented record of direct negative interactions between dogs and condors in the country. In July 2019, one nestling fell from a nest in Pichincha and lost its tail in an attack by dogs. The bird is currently

Figure 3. Red brocket deer (*Mazama rufina*) (**A, B, C, D**) chased by domestic dogs (*Canis familiaris*) (**E, F, G, H**) in the Private Reserve Madrigal del Podocarpus in the Ecuadorian Andes.

maintained in captivity (Restrepo-Cardona et al. 2024). Indirect negative interactions between dogs and condors have also been recorded in the country. Between November 2014 and June 2016, dogs were present at 28 carcasses for 40% of the total activity time in the buffer zone of Antisana National Park, and their presence showed a negative relationship with the residence time and the number of independent events of condors (Monar-Barragan et al. 2023). Furthermore, at least 16% of condors killed between 2007 and 2021 in Ecuador had consumed carrion that was deliberately poisoned by farmers who had experienced cattle depredation by dogs. This is a fact of significant concern because, during this period, poisoning and shooting caused an alarming loss of up to 31% of the local estimated condor population (Restrepo-Cardona et al. 2022), which has less than 150 individuals in Ecuador (Vargas et al. 2018). The species is nationally classified as endangered (Freile et al. 2019) and globally listed as vulnerable (BirdLife International 2024).

Our records add evidence to support the negative impacts of dogs on one of the largest mammals in the tropical Andean Mountain range. Direct attacks of dogs on mountain tapirs were only recorded in 1994 in the Pasochoa Wildlife Refuge in Pichincha, Ecuador (Castellanos et al. 2022) and recently in the Campoalegre Soil Conservation District in the Risaralda Department, Colombia (Cepeda-Duque et al. 2024). Because of human threats such as habitat loss and poaching, the total population of mountain tapirs does not exceed 2500 individuals, and the species is listed as globally endangered, with an alarming decline

reported across its distribution range in the northern Andes (Colombia, Peru, and Ecuador) (Lizcano et al. 2016). Dog attacks on mountain tapirs can result in mortality due to injuries and the transmission of infectious diseases. A confirmed case of a mountain tapir death caused by rabies following a bite from an infected dog in Pichincha (Castellanos et al. 2022) and our records of antibiotic-resistant bacteria on two individuals in Napo suggest that the species' exposure to human-related disturbances can be an important threat not only to the mountain tapir but also to public health and food security. Dogs act as a reservoir and vector of diseases, broadly affecting large areas and multiple species and disrupting the functioning of entire ecosystems (Hughes and Macdonald 2013).

Scientific evidence of dogs attacking and disturbing deer and foxes in the northern Andes is scarce. Dog attacks on the globally vulnerable little red brocket deer in a mountain forest of Pichincha (Lizcano and Alvarez 2016; Díaz et al. 2020), a rural site of Tungurahua and a private reserve of Loja (this study), and records of dogs chasing Andean foxes in páramos of the Cayambe-Coca National Park (Zapata-Ríos and Branch 2016) and ACH Alto Pita (this study) suggest that dogs probably affect these species more frequently than expected. For the little red brocket deer and mountain tapir, temporal partitioning was a mechanism for decreasing dog encounters (Zapata-Ríos and Branch 2016). While the occupancy of the Andean fox was best predicted by the presence of dogs rather than habitat loss and fragmentation (Zapata-Ríos and Branch 2018), the species tended to be more nocturnal in areas with dogs, probably to avoid agonistic encounters (Zapata-Ríos and Branch 2016; Monar-Barragan et al. 2023). Similarly, dogs chasing and killing chilla foxes (*L. griseus*) have been studied in southern Chile (Silva-Rodríguez et al. 2010), and dogs chasing white-tailed deer were recorded in the United States of America (Young et al. 2011). Furthermore, to our knowledge, the record of dogs chasing Andean tapetis in the ACH Atacazo, a Data Deficient species according to the International Union for Conservation of Nature (Ruedas and Smith 2019), is the first documented case of negative dog-Andean tapeti interactions in Ecuador.

Our data reveal new evidence of dog attacks and disturbances on native vertebrates in high Andean ecosystems. It is of great concern that, of the 11 cases of dog chasing, harassing, competing for food resources, biting, and killing on native vertebrates presented here, eight were recorded within protected areas of Ecuador (i.e., ACH Antisana, ACH Atacazo, ACH Alto Pita, Refugio de Vida Silvestre APH Ponce-Palugillo, Reserva Chakana, Cayambe-Coca National Park, Private Reserve Madrigal del Podocarpus). Three cases were recorded in human-transformed Andean habitats near protected areas (< 4.07 km). Even though the linear distances from the recorded cases to the nearest settlements ranged from 0.07 km to 10.51 km, we cannot determine whether the dogs involved in the attacks and disturbances were feral or free-ranging animals. Negative impacts of dogs on facultative and obligate scavengers and herbivores were also recorded in Ecuadorian protected areas by Zapata-Ríos and Branch (2016) and Monar-Barragan et al. (2023). Understanding the social-ecological drivers of dog-wildlife interactions, particularly the dog impacts on wildlife in protected areas and their surroundings, is essential to provide the best foundation for management interventions (Hughes and Macdonald 2013; Lessa et al. 2016; Paschoal et al. 2018; Zamora-Nasca and Lambertucci 2022).

For effective management and conservation of native vertebrates in Andean ecosystems, particularly those globally endangered species with populations in

decline and severely affected by human pressures such as the Andean condor, mountain tapir, and little red brocket deer (Lizcano et al. 2016; Lizcano and Alvarez 2016; Castellanos et al. 2022; Restrepo-Cardona et al. 2022, Restrepo-Cardona and Hull 2023, 2024; BirdLife International 2024; Cepeda-Duque et al. 2024), it is essential to assess the impact of dogs on species populations in Ecuador, either through direct attacks on individuals (Restrepo-Cardona et al. 2024), chasing and harassment, disease transmission (Castellanos et al. 2022), fear-induced behavioral changes (Zapata-Ríos and Branch 2016), or by causing conflict with local farmers through attacking livestock, which may inadvertently lead to wildlife poisoning (Restrepo-Cardona et al. 2022). Our results also suggest that dogs competed or at least interfered with the Andean condor and Andean fox feeding. Competition for food resources between dogs and condors had previously been reported in the buffer zone of Antisana National Park (Monar-Barragan et al. 2023). We call on the Ecuadorian government authority, academy, animal welfare groups, NGOs, and civil society to invest in assessing and reducing dog impacts on native vertebrates in high Andean ecosystems. Given the complexity of the human-dog interface, strategies to mitigate the deleterious effects of dogs on wildlife should address the lack of or inadequate legislation, non-responsible ownership, unregulated intentional and unintentional feeding of dogs, limitations and wrong functioning of animal shelters, power asymmetries amongst relevant stakeholders, and uncontrolled dog populations (Lambertucci et al. 2023).

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

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Author contributions

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Data availability

All of the data that support the findings of this study are available in the main text.

References

BirdLife International (2024) Species factsheet: Vultur gryphus. https://www.birdlife.org [24/08/2024]

Castellanos A, Dadone L, Ascanta M, Pukazhenthi B (2022) Andean Tapir (Tapirus pinchaque) social groups and calf dispersal patterns in Ecuador. Revista Boletín Técnico, Serie Zoológica 17: 9–14. https://journal.espe.edu.ec/ojs/index.php/revista-serie-zoologica/article/view/2858

Cepeda-Duque JC, Arango-Correa E, Frimodt-Moller C, Lizcano DJ (2024) Howling shadows: First report of domestic dog attacks on globally threatened mountain tapirs in high Andean cloud forests of Colombia. Neotropical Biology and Conservation 19: 25–33. https://doi.org/10.3897/neotropical.19.e117437

Díaz E, Donoso G, Sáenz C, Dueñas I, Cabrera F (2020) Clinical and pathological findings in a Dwarf Red Brocket *Mazama rufina* (Mammalia: Cetartiodactyla: Cervidae) attacked by dogs. Journal of Threatened Taxa 12: 16885–16890. https://doi.org/10.11609/jott.5552.12.13.16885-16890

Doherty TS, Dickman CR, Glen AS, Newsome TM, Nimmo DG, Ritchie EG, Vanak AT, Wirsing AJ (2017) The global impacts of domestic dogs on threatened vertebrates. Biological Conservation 210: 56–59. https://doi.org/10.1016/j.biocon.2017.04.007

Freile JF, Santander TG, Jiménez-Uzcátegui G, Carrasco L, Cisneros-Heredia DF, Guevara EA, Sánchez-Nivicela M, Tinoco BA (2019) Lista roja de las aves del Ecuador. Ministerio del Ambiente, Aves y Conservación, Comité Ecuatoriano de Registros Ornitológicos, Fundación Charles Darwin, Universidad del Azuay, Red Aves Ecuador y Universidad San Francisco de Quito, Quito.

Gompper ME (2013) Free-ranging dogs and wildlife conservation. Oxford University Press, Oxford. https://doi.org/10.1093/acprof:osobl/9780199663217.001.0001

Groom MJ, Meffe GK, Carroll CR (2006) Principles of Conservation Biology. Sinauer Associates Inc.

Hughes J, Macdonald DW (2013) A review of the interactions between free-roaming domestic dogs and wildlife. Biological Conservation 157: 341–351. https://doi.org/10.1016/j.biocon.2012.07.005

Lambertucci SA, Zamora-Nasca LB, Sengupta A, de la Reta M, Plaza PI (2023) Evidence-based legislation, strong institutions and consensus needed to mitigate the negative impacts of free-ranging dogs. Ambio 53: 299–30. https://doi.org/10.1007/s13280-023-01928-y

Lessa I, Corrêa Seabra Guimarães T, de Godoy Bergallo H, Cunha A, Vieira EM (2016) Domestic dogs in protected areas: A threat to Brazilian mammals? Natureza & Conservação 14: 46–56. https://doi.org/10.1016/j.ncon.2016.05.001

Lizcano DJ, Alvarez SJ (2016) Mazama rufina. The IUCN Red List of Threatened Species, e.T12914A22165586.

Lizcano DJ, Castellanos J, Tapia A, Lopez-Malaga A (2016) Tapirus pinchaque, Mountain Tapir. The IUCN Red List of Threatened Species, e.T21473A45173922. https://doi.org/10.2305/IUCN.UK.2016-1.RLTS.T21473A45173922.en

Monar-Barragan PH, Araujo EE, Restrepo-Cardona JS, Kohn S, Paredes-Bracho A, Vargas FH (2023) Impacts of Free-Ranging Dogs on a Community of Vertebrate Scavengers in a High Andean Ecosystem. Tropical Conservation Science 16: 1–10. https://doi.org/10.1177/19400829231218409

Paschoal AMO, Massara RL, Bailey LL, Doherty Jr PF, Santos PM, Paglia AP, Hirsch A, Chiarello AG (2018) Anthropogenic Disturbances Drive Domestic Dog Use of Atlantic Forest Protected Areas. Tropical Conservation Science 11: 1–14. https://doi.org/10.1177/1940082918789833

Restrepo-Cardona JS, Hull V (2023) A call to mitigate threats and fill existing knowledge gaps to facilitate the conservation of the Andean Condor in Colombia. Ornitología Colombiana 23: 44–47. https://doi.org/10.59517/oc.e556

Restrepo-Cardona JS, Parrado MA, Vargas FH, Kohn S, Sáenz-Jiménez F, Potaufeu Y, Narváez F (2022) Anthropogenic threats to the Vulnerable Andean Condor in northern South America. PLoS ONE 17: e0278331. https://doi.org/10.1371/journal.pone.0278331

Restrepo-Cardona JS, Kohn S, Narváez F, Pineida R, Vargas FH (2024) Life History of the Andean Condor in Ecuador. Tropical Conservation Science 17: 1–8. https://doi.org/10.1177/19400829241238005

Ruedas LA, Smith AT (2019) Sylvilagus andinus. The IUCN Red List of Threatened Species 2019. [errata version published in 2020]

Silva-Rodríguez EA, Ortega-Solís GR, Jiménez JE (2010) Conservation and ecological implications of the use of space by chilla foxes and free-ranging dogs in a human-dominated landscape in southern Chile. Austral Ecology 35: 765–777. https://doi.org/10.1111/j.1442-9993.2009.02083.x

Vargas FH, Narváez F, Naveda-Rodríguez A, Carrasco L, Kohn S, Utreras V, Zapata-Ríos G, Ron K (2018) Segundo censo nacional del cóndor andino en Ecuador. Ministerio del Ambiente, The Peregrine Fund, and Grupo Nacional de Trabajo del Cóndor Andino en Ecuador, Quito.

Young JK, Olson KA, Reading RP, Amgalanbaatar S, Berger J (2011) Is wildlife going to the dogs? Impacts of feral and free-roaming dogs on wildlife populations. Bioscience 61: 125–132. https://doi.org/10.1525/bio.2011.61.2.7

Zamora-Nasca LB, Lambertucci SA (2022) Domestic dog–wildlife interactions and support for pet regulations in protected areas. Biological Conservation 273: 109705. https://doi.org/10.1016/j.biocon.2022.109705

Zamora-Nasca LB, di Virgilio A, Lambertucci SA (2021) Online survey suggests that dog attacks on wildlife affect many species and every ecoregion of Argentina. Biological Conservation 256: 109041. https://doi.org/10.1016/j.biocon.2021.109041

Zapata-Ríos G, Branch LC (2016) Altered activity patterns and reduced abundance of native mammals in sites with feral dogs in the high Andes. Biological Conservation 193: 9–16. https://doi.org/10.1016/j.biocon.2015.10.016

Zapata-Ríos G, Branch LC (2018) Mammalian carnivore occupancy is inversely related to presence of domestic dogs in the high Andes of Ecuador. PLoS ONE 13: e0192346. https://doi.org/10.1371/journal.pone.0192346